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FOURTH ANNUAL REPORT OF THE DIRECTOR.

SUBMITTED TO THE TRUSTEES JAN. 11, 1893.

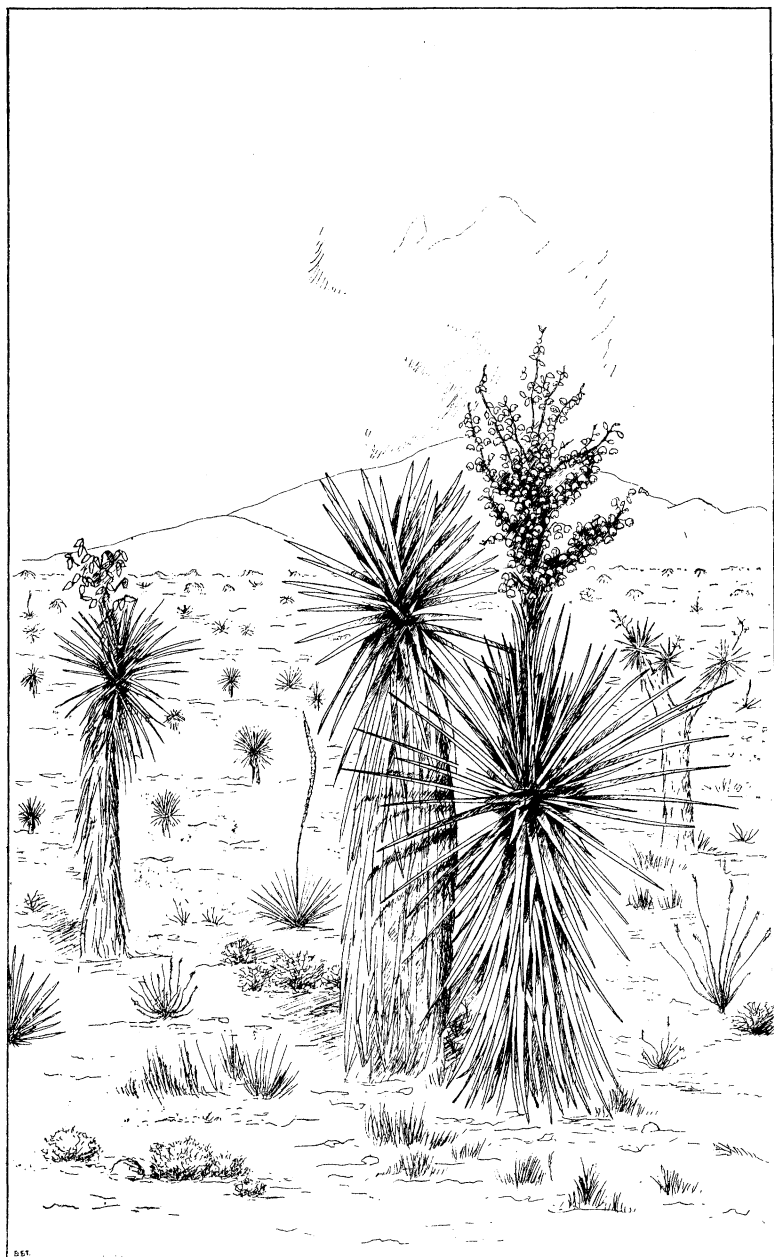
To the Board of Trustees of the Missouri Botanical Garden:

The following report on the Missouri Botanical Garden and the Henry Shaw School of Botany is respectfully submitted, in compliance with the rules of the Board.

THE BOTANICAL GARDEN.

It is gratifying to me to be able to report that the number of visitors to the grounds through the past year has been considerably increased as compared with preceding years, and, so far as could be gathered from their remarks, they have shown an appreciation of the improvements which have been made, and especially the more natural grouping of the plants and the addition of large specimen cacti, yuccas, etc., from the arid regions. On the open Sunday in June about 16,000 visitors were counted; but on the open Sunday in September only about 4,650 persons visited the Garden, owing to rains through the greater part of the afternoon. As in former years, the visitors on these holidays have been orderly and for the most part unusually appreciative of the attractions of the Garden.

A marked improvement has been made this year in opening up the eastern side of the garden proper, which has been densely shaded heretofore by overgrown shrubbery. This has permitted the conversion of a large tract of bare ground into lawn. The decorative plants, which have been increased considerably in number notwithstanding this seeming extension of the lawn area, have been grouped in clusters instead of being arranged as heretofore in long monotonous rows of a single species. The number of species in cultivation has been greatly increased, chiefly through the liberality of various botanical gardens, from



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which some 1,475 packets of seeds and 100 living plants have been received. About 3,025 packets of seeds of our own collection have been distributed to these and other institutions to which the Garden stood indebted. A considerable number of purchases have been made, also, and I was able to secure from the dry district of Texas, Arizona and California a number of representatives of the more characteristic yuccas, agaves and cacti of those regions.

The average number of gardeners and laborers employed has been 42, and the pay-roll for the year amounts to \$16,582.92. While the number of improvements undertaken in 1892 is not as large as in 1890 and 1891, considerable advance has been made in this direction. These improvements have been reported in detail in my reports to the Board each month, but by way of summary it may be said here that about 500 lineal feet of granitoid walk was laid in front of the new Herbarium Building on Tower Grove avenue, and the ground about the building and along this walk was suitably graded and seeded to grass or sodded; about 4,600 square feet of sod was laid and some 4,200 square feet of ground spaded and seeded to lawn grass; about 1,800 running feet of drain and conduit pipe was laid, and the necessary surface connections made; 5,900 square feet of walk was substantially made, most of it consisting of very old walks of defective construction; about 6,000 running feet of brick edging was relaid along the walks; some 2,000 running feet of board fence was rebuilt about the pasture; two small rockeries were built near the Linnean House; and a new boiler has been placed for the Succulent House. Repairs of considerable extent have been made on the greenhouses, the farm-house, and the Lodge. Several hundred additional metallic tree labels with raised letters have been placed, and several thousand celluloid labels, marked with indelible ink, have been brought into use in the greenhouses and elsewhere, those used in the wild garden being wired to long iron rods thrust deeply into the soil, beyond danger of displacement

by frost, while those used in the flower-pots are fastened by Megill clasps to flat strips of galvanized iron, which do not turn so easily as the round rods.

About 65 specimen plants, which could be spared from the greenhouses, were loaned in the fall to the Missouri commissioners for exhibition at the Columbian Exposition. The surplus bedding plants when the borders were cleared in autumn, were in part distributed among the hospitals and poorer homes of the city, and I wish to express my especial gratitude to the Ladies' Flower Mission and the management of the Bethel for their kind co-operation in the distribution of about 1,000 such plants.

The additions to the herbarium have consisted in the current American collections, about 3,000 duplicates from the herbarium of the late John Ball, and a set of some 1,200 New Zealand plants, purchased; and a set of the valuable *Exsiccatae* of the Austrian Flora, donated by the Vienna Museum, besides many smaller collections and single specimens presented by correspondents, to whom the thanks of the Garden are extended. The herbarium, as now arranged, is composed as follows: —

The George Engelmann herbarium.....about 98,000 specimens.

The general herbarium of higher plants

 The Bernhardi herbarium.....about 57,500

 Other specimens.....“ 31,500

89,000 “

The collection of Thallophytes.....about 16,000 “

Making a total of about 203,000 specimens.

It has not been found practicable to add to the library as freely as I could have wished, but during the year about \$1,427.00 has been spent for purchases and binding. A much needed card index to the species of plants described and figured in works at the Garden has been begun, and one assistant, Mr. J. C. Bay, is employed for this work. The large collection of pamphlets has been protected from injury and rendered readily accessible by inclosing each in a neat pasteboard cover with cloth back, resembling a thin

book cover, the name being written on a white label pasted near the top on the front of the cover. This plan, which I first saw in use in the Department of Agriculture at Washington, has commended itself to me as the best method of preserving pamphlets, each of which is stitched to muslin strips fastened to the inside of the binder; and the cost, \$4.00 per hundred covers, is not disproportionate to the money value of the pamphlet, which is usually small in comparison with its scientific usefulness. Each pamphlet in its binder is placed on the shelves of the library, in its proper relation to larger volumes treating of subjects similar to its own, the arrangement of the whole being according to subjects, and the books being distributed through the building so as to be most convenient with reference to the herbarium. An enumeration of the present contents of the library shows: —

5,225 books, appraised at.....	\$19,300 00
6,230 pamphlets, appraised at.....	1,850 00
<hr/>	
Giving a total valuation of \$21,150 00	

In the latter part of October, Dr. Sturtevant, whose gift of *Capsicum* material and notes is referred to below, wrote me that he desired to make a further donation to the Garden of his entire botanical library, including the scrap books of his own writings and his manuscript notes on edible plants, stating that he should wish to retain the books during his life, or so long as he might have occasion to use them, but asking me to take the necessary steps to secure a formal transfer of ownership at once. The library presented in this manner by Dr. Sturtevant is undoubtedly the most complete and valuable American collection of pre-Linnæan botanical books, and represents the expenditure of a great amount of time and money on his part, since he has for many years been interested in bringing together the early literature of the science, especially in its application to economic plants. In accepting this generous and quite unsolicited gift, the Board of Trustees of the Garden at



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their November meeting expressed their appreciation of its value and of the spirit in which it was tendered, and voted that on its actual receipt at the Garden it should be arranged, together with other works published prior to the time of Linnæus, in a separate alcove, the whole to be known as the E. Lewis Sturtevant library of pre-Linnæan botany. Whenever this alcove shall be opened, a catalogue of its contents will be published, in order that students of botany may know where a collection of books of this character can be consulted.

Horticultural work was carried on efficiently by Mr. J. C. Duffey, up to the time of his death on the third of December, and I cannot speak in terms of too warm appreciation of his interest in the development of his department and the success of the course of study for garden pupils, in whose instruction he took an important part. Mr. Duffey also had maintained very pleasant relations for the Garden with the St. Louis Florists' Club and the State Horticultural Society. At the time of his death he had in hand several pieces of work on fungi and insects, some of which it may be found practicable to complete in the future.

Mr. A. S. Hitchcock, for two years my principal assistant in botany, severed his connection with the Garden about the beginning of the year, to accept a professorship in the Kansas Agricultural College. His work was continued temporarily through the winter months by Mr. T. A. Williams, of the South Dakota Agricultural College, and the vacancy was filled in March by the appointment of Mr. F. W. Dewart.

In the early part of the year, Dr. E. Lewis Sturtevant donated to the Garden his extensive and valuable collection of specimens, manuscript and illustrations, largely in color, of the genus *Capsicum*, on condition that the genus should be studied with reference to an ultimate monograph of the wild and cultivated forms. On accepting this generous gift, I at once procured seeds of all obtainable varieties, and about 125 named sorts were cultivated by Mr. Duffey, and

made the subject of study through the season by Mr. Dewart; and it is proposed to continue the work through 1893 and as much longer as may be necessary. With the sanction and aid of the Board, I was enabled to spend the greater part of the spring months in Texas, Arizona, and California, in a study of the pollination of the Yuccas, and a paper embodying the results of my observations will appear in the Fourth Report of the Garden.

In order to obtain facilities not in its possession for the study of marine botany, and with a view to promoting such study, the Board this year authorized the Director to subscribe for the present \$100.00 annually, for a botanical research room in the Marine Biological Laboratory at Wood's Holl, Mass., on condition that it should be actually used each year for botanical work. It is not probable that a member of the Garden staff can regularly make use of the facilities secured in this way, and when this cannot be done the Director is desirous of having the room used by some competent botanist not connected with the Garden, and invites correspondence early in each year from professors or others who may wish to study our marine flora. The only conditions imposed in such allotment of the room are that it shall be used exclusively for botanical work, and that in the publication of any results obtained the Garden shall receive credit for the facilities offered; but the Director would wish, if good reason to the contrary does not exist, to have the results of any important research published in the reports of the Garden. During the season of 1892, the room was used by Mr. M. A. Brannon, who was occupied with a study of *Grinnellia Americana*.

In March last three vacancies among the Garden pupils were filled, in accordance with an announcement issued in the preceding November. One of the scholarships was given to a nominee of the St. Louis Florists' Club, and the other two were awarded on the results of competitive examination. The young men who received these scholarships have applied themselves to their work through the year with

commendable interest. Subsequently to the filling of these vacancies, one of the original appointees of 1890 resigned his scholarship through lack of interest in his work, and an announcement was issued in November stating that the vacancy will be filled in March next, on the result of examinations.

An important addition to the conveniences of the Lodge has been made by providing hot water for the bath room. The gardening and other horticultural periodicals taken at the Garden are carried to the Lodge on their receipt, and allowed to remain on file in the reading room for a reasonable time, after which they are returned to the Garden library. In addition to these current numbers of journals, the reading room contains a reference library of about 75 volumes relating to practical gardening.

When the course of study for garden pupils was outlined, three years ago, provision was made for carrying it through six years if necessary, in order that the subjects it was desired to teach might receive ample attention. It was evident to me at the time that the course was much longer than was desirable, and I hoped to be able to shorten it considerably after testing practically the time needed for the several studies. Such a test has been made now, and on the 9th of March last the original resolution of the Board * was modified in such a manner as to shorten the course to four years, without omitting any of the manual work or any of the studies originally included. Vacations have now been fixed so as to comprise the first two weeks in July, and two weeks extending from the 21st of December to the 4th of January, inclusive.

In its present form the work of the scholarship course is divided as follows. All of the first year is given to manual work, as is half of each day during the remaining three years. The other half of the last three years is

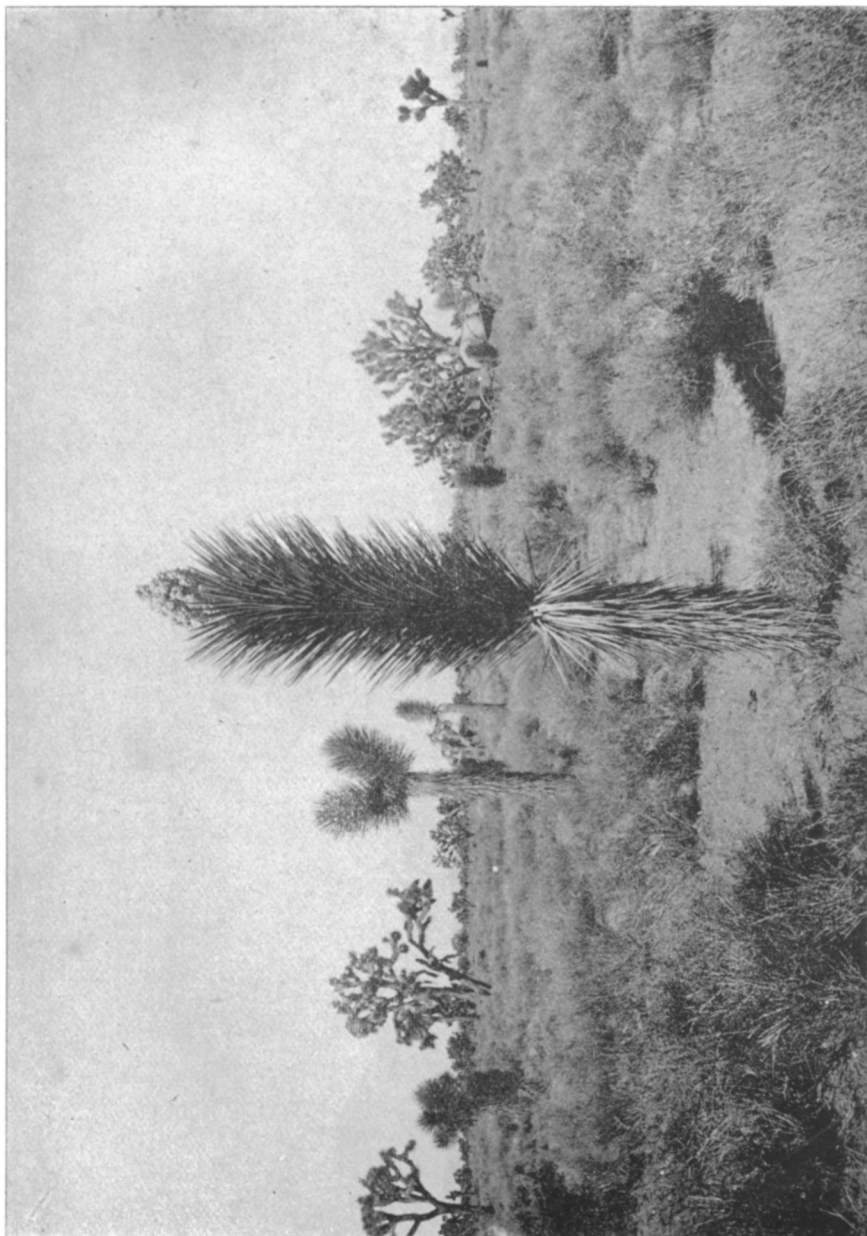
* Report, 1890, p. 94.

given to studies, distributed as is shown in the annexed schedule.

COURSE OF STUDY.

YEAR.	TERM.	STUDIES.					PER WEEK.
SECOND.	April to June.	Floriculture, 3 exercises weekly.			Surveying, 1 exercise weekly.	Drainage, 2 exercises weekly.	6
	July to Sept.	Floriculture, 3		Small Fruit Culture, 3			6
	Oct. to Dec.	Floriculture, 1	Elementary Botany, 2	Orchard Culture, 2	Surveying, 1		6
	Jan. to Mar.	Floriculture, 1	Elementary Botany, 2	Orchard Culture, 1	Surveying, 1	Botany of Weeds, 1	6
THIRD.	April to June	Vegetable Gardening 4	Botany of Vegetables 1	Landscape Gardening 1			6
	July to Sept.		Botany of Fruits, 1	Landscape Gardening 1	Fungi, 3	Book-Keeping, 1	6
	Oct. to Dec.		Botany of Trees and Shrubs, 2		Fungi, 3	Book-Keeping, 1	6
	Jan. to Mar.		Twigs of Woody Plants, 1	Landscape Gardening 1	Fungi, 2	Book-Keeping, 2	6
FOURTH.	April to June	Economic Entomology, 1	Botany of Ferns, 2		Special Theoretic'l Gardening 2	Garden Accounts, 1	6
	July to Sept.	Economic Entomology, 2	Botany of Garden Flowers, 2	Forestry, 2			6
	Oct. to Dec.	Economic Entomology, 2	Botany of House Plants, 2	Forestry, 1	Vegetable Physiology 1		6
	Jan. to Mar.	Special Theoretic'l Gardening 2		Forestry, Seeds and Seedlings, 1	Vegetable Physiology 2	Garden Accounts, 1	6

Of the 72 weekly exercises (each for three months) there shown, 20 are given to gardening proper, inclusive of fruit culture, 9 to surveying, drainage and landscape gardening, 6 to book-keeping, 7 to economic entomology, 5 to forestry, and 25 to botany, in its strictest applications to gardening. All of the studies capable of being so taught are taught in



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the laboratory, and all of the theoretical instruction is expected to be practically tested in the performance of the manual work required of students.

Four annual events provided for under the will of Henry Shaw have taken place in the course of the year, namely: the delivery of the third flower sermon, in Christ Church Cathedral, by Rev. Cameron Mann, of Kansas City; the third banquet to the Trustees of the Garden and their guests, presided over by the Chancellor of Washington University; the third banquet to gardeners, florists and nurserymen, presided over by the Director of the Garden; and the award of the second series of Shaw premiums at a floral exhibition, given under the management of the Florists' Club of St. Louis.

The flower sermon will be printed in the Fourth Report of the Garden, which will include also abstracts of the proceedings at the two banquets. The Shaw premiums were offered for the same class of plants as in 1891.* Competition was not made for several of them, but the following awards were recommended by the officers of the Florists' Club and approved by the Board of Trustees: Chrysanthemums (including a new seedling of decided merit), \$97.00; Orchids, \$20.00; Palms, \$132.00; Ferns, \$38.00; Oxalis, \$8.00; Crotons, Cannas, and decorative plants other than the above, \$92.00. The seedling Chrysanthemum which received the Shaw premium in 1891 was exhibited under the name Mrs. E. D. Adams, by Pitcher and Manda. That of 1892, named for President W. R. Smith (of the Society of American Florists), was exhibited by E. G. Hill.

THE SCHOOL OF BOTANY.

Until the end of the college year 1891-2, Mr. H. J. Webber continued to act as my assistant at the School of Botany, performing duties similar to those of the preced-

* See Third Report, p. 18.

ing year, and he spent the greater part of the summer vacation at the School, engaged in scientific work. In the early part of September he resigned his position to accept a more responsible one in the sub-tropical laboratory established at Eustis, Fla., by the United States Department of Agriculture. Since the opening of the present college year I have been assisted by Mr. Jared G. Smith, whose duties are similar to those performed by Mr. Webber. Up to the present fall the position has been that of assistant, and the appointment was made by me, in consultation with the Chancellor of the University; but it has been changed this year to an instructorship in Washington University, and the appointment is made by the Board of Directors of the University, though the duties and salary of the appointee remain the same as heretofore.

Though the endowment property of the School is regaining some of its original value, lost through the depreciation of the neighborhood in which it is situated, the income of the School is still too small to allow any considerable addition or extension to be made, and only the books and material needed for immediate use have been purchased. Owing to causes which have been stated in a previous report,* the number of special students in the School of Botany remains about the same as in previous years, but in addition to the instruction of undergraduates in the University, and garden pupils, special classes have been carried on as follows: In the spring of 1892, special phænogamic botany, structural botany, histology, and ferns. In the fall of 1892, special systematic botany, bryophytes, and thallophytes. For the first time since the establishment of the School, I have been able to secure several undergraduate engineering students for a study of the histological and other means of distinguishing timbers, and the adoption of an elective system by the Faculty of the University promises to give more opportunity for botanical instruc-

* Report 1890, p. 100.

tion than has been possible under the previous arrangement of the undergraduate courses. During the year one contribution has been published from the School, a supplement to the catalogue of Nebraska plants, by Mr. Webber.

As heretofore, the facilities at the Garden and School of Botany have been utilized by visiting botanists, and an effort is made to assist competent students and investigators in every possible manner.

Respectfully submitted,

WILLIAM TRELEASE,
Director.

St. Louis, Mo., Jan. 11, 1893.